MARSH TYPE MANAGEMENT FOR CRAWFISH

By

W. Guthrie Perry, Jr.
Louisiana Wild Life and Fisheries Commission
Grand Chenier, Louisiana 70643

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Introduction

This paper includes a discussion of crawfish culture in the extreme southern portions of Louisiana, the marshes. Also, the results of several of our research projects will be incorporated into the techniques where appropriate.

We of the Louisiana Wild Life and Fisheries Commission are concerned over the fact that the marshlands of Louisiana are being altered into areas not conducive to aquatic wildlife. The quantity and quality of nursery grounds for sport and commercial fisheries are gradually declining. Each year the vast wetlands that are so very important to our fur-bearers and wintering waterfowl decrease in size.

Since land-use practices have a direct influence on wildlife, the development of practices which result in financial gain to the landowners and at the same time benefit wildlife are essential. Multiple use practices offer the greatest solutions for capitol gain from a particular marsh area. However, the development of practices which are compatible is essential.

A multiple use program which may offer a solution to the problem is waterfowl management and crawfish production. This discussion relates certain aspects of impoundment management for crawfish and the relationship of these practices to the development of a commercial or recreational harvest of waterfowl.

Four years ago we began exploring the possibilities of the commercial production of crawfish in coastal Louisiana. At that time it was theorized that the warmer climate of our vast fertile coastal lands should offer longer growing seasons resulting in earlier marketable crawfish. We felt that possibly thousands of acres of marshlands now idle may possess a potential to crawfish farmers. It was an established fact that these marshes often produced wild crops of crawfish when environmental conditions were right.

The availability of land suitable for economically feasible crawfish farming is limited. Generally, the land must be flat and an adequate water supply must be available for flooding during specific periods. The land must be capable of producing certain types of aquatic plants, which provide food and cover for crawfish. Also, soils should be able to hold water and permit the construction of permanent levees. A survey of coastal Louisiana revealed that a minimum of a half million acres of freshwater-intermediate marshlands met the above criteria.

Unfortunately, not all areas are suitable for the commercial production of crawfish. Successful management practices in one locality, though they may suggest the general pattern for management in another, usually cannot be applied without further investigation. Local conditions such as soil fertility, soil type, length of growing season, water quality, presence of predators, presence of natural stock and vegetation type and quantity are a few of the

variables that must be determined for different regions. Since these will be discussed in detail by other speakers, I will only mention the factors unique to the culture of crawfish in the marshes.

Pond Construction

The Louisiana coastal marsh is comprised of approximately 4,212,000 acres of land which varies in elevation of minus one foot to plus two feet above sea level. Marsh land has been defined as an area having a water table that is equal to the land surface and in Louisiana the salinities may vary from freshwater up to sea strength. This wide variation in salinity influences the establishment of plant and animal communities which are capable of tolerating various degrees of salinity.

The marshes of Louisiana have been divided into three types. The active delta marshes consisting of some 274,800 acres extends from Venice, Louisiana out to the mouth of the Mississippi River. Construction of levees to contain water in this area is almost impossible because of the extremely fluid nature of the soil. The only stable levees that have been built in this area were placed on pass banks or natural levee systems.

The sub-delta marshes are approximately 2,745,300 acres in size and extend from the active delta to the western edge of Vermillion Bay. The mineral deposits of these marshes are reported to be primarily of marine origin and consequently, has a relatively high soil salinity. Soil conditions in this area are generally not conducive to the establishment of permanent levees. However, some of the firmer areas will support levees.

The third type of marsh is the chenier-plain marshes of Southwest Louisiana. These marshes are approximately 1,191,900 acres in size. Soils in this area are of a soft organic clay and are much better suited for impoundment construction than the other types (Figure 1).

Some of the marsh soils are high in peat and sand content and will not hold water. There are products on the market to seal ponds, but this would not be practical. The marsh soil must have a high enough clay content to assure that the pond will hold water. A good rule of thumb to use to determine this is to pick up a handful of moist soil and shape it into a ball. If the ball remains intact and does not crumble after considerable handling, there is enough clay in the soil to provide a watertight seal. At least the surface five feet should be checked using a soil auger. Should any construction problem arise, a local Soil Conservation Service representative should be contacted.

An adequate water supply must be provided if the pond is to be successful. Well water may be used; however, the most economical supply may be that from canals and natural streams. A prospective coastal crawfish farmer will have to know what his yearly salinity variations will be. He must also keep in mind that his pond salinities may increase with summer evaporation and he will have to dilute this with less saline water. Hence, a close surveillance of the coastal water salinities must be maintained as

Figure 1. Of the three types of marsh, the Chenier plain marshes are the best suited for impoundment construction. One of the major problems encountered in most all marsh situations is pond construction. Ponds have to be dug using either pontoon draglines or conventional draglines on mats (shown below) because of the fluid nature of the marsh soil.

our research data indicates that crawfish will not do well in concentrations in excess of 6 ppt (parts per thousand). Generally, soil and water conditions that are conducive to the production of alligator grass (Alternanthera philoxeroides), wild millet (Echinochloa walteri) and sprangletop (Leptochloa fascicularis) are fresh enough for crawfish culture. Also, persons located below rice production areas should avoid using any run off that may contain a residue from treated seeds.

Good drainage is also desirable when a pond site is being selected. If at all possible, it is better to build the pond above marsh level as pumping is expensive.

Marsh pond levees are usually built using either pontoon draglines or conventional draglines on mats, because of the semi-fluid nature of the soil. In the construction of ponds on Rockefeller Refuge, Grand Chenier, Louisiana, a maximum levee height of three to four feet during the initial spoil placement was adhered to. This was to prevent the excessive weight from damaging the foundation of the levee. Also, a berm of at least 12 feet is left on the canal side of the levee to prevent the levee from sluffing. New levees are usually allowed to dry from six months to a year before they are reshaped and dressed. A finished grade of approximately four feet above marsh level is adequate; however, it must be remembered that levees may experience as much as 60 percent shrinkage due to the semi-fluid nature of the soil. Sufficient elevations to prevent flooding or overflow from back-water are necessary.

Management

Our experiences indicate that the management techniques for raising crawfish and the production of choice waterfowl foods in marsh ponds appear to be synonymous. In many marsh situations the two may be successfully incorporated, thus resulting in greater production of both resources and a higher margin of monetary profit to marshland holders (Figure 2). Marsh farming practices for crawfish production in coastal Louisiana are as follows:

Time	Method Recommended
Early spring*	Levees built, pumping units installed.
March 1st*	Pond dried, cover established, fish eradication.
May 1st-June 1st*	Pond flooded, and stocked with crawfish.
June 1st*	Pond slowly dewatered and remain dry.
Late September	Pond reflooded, 6-12" of water by October 15th.
December-May 15th	Crawfish harvested.
May 15th-June 1st	Pond slowly dewatered. (Cycle repeated)

*New ponds not containing a natural stock of crawfish.

Preparation of Pond

In the absence of a natural stock of crawfish, potential ponds should be dewatered by March or earlier if possible and prepared for stocking. If there are low places where water persists, rotenone should be added to eradicate any fish present. By May 1st, a natural stand of vegetation should be present and the field should be flooded to approximately 8-10 inches for

Figure 2. The recreational value of crawfishing is inestimable. Pictured below, a sport baits lift nets to be fished in a crawfish-waterfowl managed impoundment.

stocking. The flooding and drying operations must be accomplished to coincide with the natural needs of the crawfish and the annual grasses upon which they feed.

Stocking

On new ponds, crawfish should be stocked in late May when they are easily obtained and the price is relatively low. Stocking rates of the red swamp crawfish (Procambarus clarki) may range from zero pound per acre in areas containing a natural stock of crawfish up to 95 pounds per acre in areas completely void of crawfish and cover. The white river crawfish (Procambarus blandingi acutus) is rarely taken from shallow organic marsh ponds and probably would not do well if stocked into these conditions.

Dewatering

The initial dewatering of the impoundment should begin approximately two to three weeks after stocking, around the first of June, and should be drawn out over a period of two to four weeks. The crawfish will begin to burrow in the soft mud as the pond is slowly dewatered. Quick draining will expose many crawfish to predators. The marsh crawfish which reach a peak mating period during April and May, remain dormant until the pond is reflooded in early fall.

The annual summer drying of freshwater impoundments is also necessary so that lake beds are allowed to solidify and oxidize, increasing available nutrient levels many fold. The seeds of the annual grasses must also be on exposed soil to germinate.

Beginning in late August, eggs are laid and simultaneously fertilized by the sperm held in the receptacle of the female crawfish. The eggs (about 400) are deposited on the underside of the female's tail. Approximately 14 to 21 days later, hatching occurs and it takes another two weeks before the young are able to make it on their own.

Reflooding

Approximately 6-12 inches of water are added beginning around the last of September. If the ponds are not reflooded by this time the females are believed to remain in the burrows and may become canibalistic. Also, crowding and shortage of food in the burrows will retard growth, causing a late harvest. Early crawfish bring the highest prices; therefore, flooding should be done as early as possible. Reflooding at this time is especially attractive to the early waterfowl migrants such as teal and pintail. Crawfish harvesting may begin in early December in some instances, catching adults or late hatches from the year before.

The whole crawfish farming program is affected by water temperature. It has been evident in the past that marsh ponds prematurely flooded have experienced varied results. If they are sparcely vegetated or contain a type cover close to the ground the females may be driven from the burrows early because of extremely hot water. Naturally, this would have a direct effect upon the production and survival of young. Other ponds containing more dense stands of vegetation may benefit due to a "shading

effect." Also, the erratic occurrences of an early fall with cool to moderate temperatures has saved a lot of early flooded ponds.

Marsh ponds as a rule are slowly dewatered a little earlier than the inland ponds due to extreme water temperatures detrimental to crawfish. The ponds remain dry until the next September flooding. The cycle is repeated.

Rockefeller Refuge has been intensively managed for waterfowl for the past 16 years. This has largely been through the construction and management of impoundments for natural waterfowl foods. The intermediate to freshwater marsh impoundments are managed for such choice annual grasses and sedges as wild millet, nutgrass (Cyperus sp.), sprangletop and foxtail (Setaria magna). The techniques for the management of these duck food factories are essentially the same as that for crawfish production. The ponds are dried in mid-May and remain dry until late September permitting the natural germination of the annual grass seeds.

During the last two years pumping units have been installed bringing the water of approximately 6,000 acres under direct control. Before this, water manipulation was on a gravity flow system. Management techniques employed in these impoundments, particularly in the areas controlled by these pumping units, have sufficiently increased the production of crawfish as well as desirable waterfowl food plants. Before the impoundment management system was begun on the refuge, the annual duck counts usually

averaged fewer than 75,000. Since the impoundments have been constructed, the annual duck counts range up around 400,000 to 600,000 annually, with a good portion of these using the fresh-water impoundments which also have resulted in good yields of crawfish when managed properly (Figure 3). The recreational resource of crawfishing has recently been permitted on a limited basis.

In summary, more wetlands would be created and preserved if landowners could get some assurance of added profits from multiple land usage programs such as the production of crawfish in waterfowl impoundments. This potential exists in Louisiana and bordering states where the crawfish is a commercially important human food item.

Figure 3. Management techniques employed on Rockefeller Wildlife Refuge, Grand Chenier, Louisiana, have sufficiently increased the production of crawfish as well as desirable freshwater waterfowl food plants.